

Otherwise, during a stage S274 of flowchart 260, scale factor module 161 determines if operating temperature signal  $OT_{s2}$  (or alternatively operating temperature signal  $OT_{s1}$ ) is less than a temperature  $T4$  (e.g., +35 C) as listed in scale factor curve 162. If so, during stage S276 of flowchart 260, scale factor module 161 generates scale factor signal  $SF_{s1}$  equating a computation of an interpolation equation illustrated in stage S276, which is a function of scale factor  $SF3$ , a scale factor  $SF4$ , temperature  $T3$ , and temperature  $T4$  as listed in scale factor curve 162.

Otherwise, during a stage S278 of flowchart 260, scale factor module 161 determines if operating temperature signal  $OT_{s2}$  (or alternatively operating temperature signal  $OT_{s1}$ ) is less than a temperature  $T5$  (e.g., +60 C) as listed in scale factor curve 162. If so, during stage S280 of flowchart 260, scale factor module 161 generates scale factor signal  $SF_{s1}$  equating a computation of an interpolation equation illustrated in stage S280, which is a function of scale factor  $SF4$ , a scale factor  $SF5$ , temperature  $T4$ , and temperature  $T5$  as listed in scale factor curve 162. Otherwise, during a stage S282 of flowchart 260, scale factor module 161 generates scale factor signal  $SF_{s1}$  equating scale factor  $SF5$  as listed in scale factor curve 162.

Referring again to FIG. 6A, temperature compensation module 160 further includes a multiplier 163 for providing operating current signal  $I_{os2}$  as a product of operating current signal  $I_{os1}$  and scale factor signal  $SF_{s1}$ . MR damper 10 has a defined operating current range (e.g., 0 to 5 amperes) relating to the associated design of coil 15 (FIG. 1) and a desired range of the damping force. Accordingly, operating current signal  $I_{os2}$ , having been computed as the product of operating current  $I_{os1}$  and scale factor signal  $SF_{s1}$  is then compared against the pre-defined upper and lower operating currents of the MR damper 10. If  $I_{os2}$  is less than a lower operating limit (e.g., 0 amps),  $I_{os2}$  is set equal to the lower operating limit. Otherwise, if  $I_{os2}$  is greater than an upper operating limit (e.g., 5 amps),  $I_{os2}$  is set equal to the upper operating limit. The need for these steps would be appreciated by those having ordinary skill in the art.

FIG. 7 illustrates a temperature compensation module 360 as one embodiment of temperature compensation module 60. Temperature compensation module 360 includes a compensation curve determination module 370 for providing  
5 scale factor data 371 ("SFD 371") having computed scale factors SF1-SF5 and offset data 372 ("OSD 372") having computed offset values OV1-OV5 in response to a reception of operating temperature signal  $OT_{s2}$  (or alternatively operating temperature signal  $OT_{s1}$ ). One embodiment of a compensation data method for computing the scale factors SF1-SF5 included within SFD 371 and computing the  
10 offset values OV1-OV5 includes within OSD 372 will be subsequently described herein in connection with FIG. 8B.

Referring still to FIG. 7, temperature compensation module 360 further includes a compensation parameter determination module 380 for providing a scale factor signal  $SF_{s2}$  and an offset value signal  $OV_s$  in response to a reception of SFD  
15 371, OSD 372, and a relative velocity signal  $RV_s$  that is indicative of a velocity of MR damper 10 relative to one or more fixed point(s). When MR damper 10 is employed in a vehicle, the fixed points are represented by a coupling of MR damper 10 to a vehicle body and a coupling of MR damper 10 to a wheel whereby relative velocity signal  $RV_s$  is indicative of a velocity of MR damper 10 in response to the  
20 relative motions of the vehicle and the wheel. Temperature compensation module 360 further includes a multiplier 390 for providing an operating current  $I_{os3}$  as a product of scale factor signal  $SF_{s2}$  and operating current  $I_{os1}$  (FIG. 2) and an adder 391 for providing operating current  $I_{os2}$  (FIG. 2) as a summation of offset value signal  $OV_s$  and operating current  $I_{os3}$ . In an alternative embodiment of temperature  
25 compensation module 360, adder 391 provides operating current  $I_{os3}$  as a summation of operating current  $I_{os1}$  and offset value signal  $OV_s$ , and multiplier 390 provides operating current  $I_{os2}$  as a product of scale factor signal  $SF_{s2}$  and operating current  $I_{os3}$ .

Again, MR damper 10 has a defined operating current range (e.g., 0 to 5 amperes) relating to the associated design of coil 15 (FIG. 1) and a desired range of the damping force. Accordingly, operating current signal  $I_{os2}$ , having been  
5 computed as the sum of operating current  $I_{os3}$  and scale factor signal  $OVs$  is then compared against the pre-defined upper and lower operating currents of MR damper 10. If  $I_{os2}$  is less than a lower operating limit (e.g., 0 amps),  $I_{os2}$  is set equal to the lower operating limit. Otherwise, if  $I_{os2}$  is greater than an upper operating limit (e.g., 5 amps),  $I_{os2}$  is set equal to the upper operating limit. The need for these  
10 steps would be obvious to those having ordinary skill in the art.

FIG. 8A illustrates a compensation curve determination module 470 as one embodiment of compensation curve determination module 370 (FIG. 7). Compensation curve determination module 470 provides SFD 371 (FIG. 7) and OSD 372 (FIG. 7) in response to a reception of operating temperature signal  $OT_{s2}$  (or alternatively operating temperature signal  $OT_{s1}$ ). In generating SFD 371 and  
15 OSD 372, compensation curve determination module 470 includes data representative of a scale factor curve 471a ("SFC 471a"), a scale factor curve 471b ("SFC 471b"), a scale factor curve 471c ("SFC 471c"), an offset curve 471a ("OSC 472a"), an offset curve 471b ("OSC 472b"), and an offset curve 471c ("OSC  
20 472c"). The scale factors SF1-SF5 of scale factor curves 471a-471c are dissimilar due to a correlation of scale factor curves 471a-471c to three (3) different operating temperatures of MR damper 10 (e.g., -20 C, +20 C, and +60 C), respectively. The offset values OV1-OV5 of offset curves 472a-472c are dissimilar due to a correlation of offset curves 472a-472c to three (3) different operating temperatures  
25 of MR damper 10 (e.g., -20 C, +20 C, and +60 C), respectively. The relative velocities RV1-RV5 of both scale factor curves 471a-471c and offset curves 472a-472c are identical. Compensation curve determination module 470 utilizes one or more of the scale factor curves 471a-471c and offset curves 472a-472c in implementing a compensation data determination method in accordance with the  
30 present invention. FIG. 8B illustrates a flowchart 570 that is representative of the compensation data determination method.